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OLDER PEOPLE

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Psychometric properties of the extended Care Dependency Scale for older persons in Egypt

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Aim. The aim of this study was to determine the validity and reliability of the modified Arabic Care Dependency Scale for self-assessment of older persons in Egypt and to compare these self-assessments to proxy assessments by care givers and family members.

Background. The Care Dependency Scale is an internationally used instrument to measure care dependency. The Arabic version may improve data collection on this phenomenon in the Middle East where the population is ageing.

Design. A cross-sectional study with a sample of 611 older persons living in Greater Cairo. Participants belonged to three groups: nursing home residents, home care recipients and non-care recipients; 459 participants were also rated by proxies and 171 repeated their self-assessment after two weeks.

Methods. The correlation between sum scores of the Care Dependency Scale and the Activities of Daily Living scale was calculated to establish criterion validity. Construct validity was determined by comparing care recipients and non-care recipients with regard to their Care Dependency Scale sum scores and by exploratory factor analysis. Intraclass coefficients were used to assess test-retest reliability of self-ratings for each item. Mean differences between self and proxy assessment were calculated.

Results. The Care Dependency Scale had a strong correlation to the Activities of Daily Living scale and is able to distinguish between care recipients and non-care recipients. Factor analysis revealed one factor for basic needs and one factor for psychosocial needs. ICC values were $>0{\cdot}7$ for most items related to the factor for basic needs among care recipients. Proxy assessment yielded higher care dependency than self assessment.

Conclusion. Care Dependency Scale items for basic needs are suitable to assess care dependency among Egyptian care recipients.

Relevance to clinical practice. Assessment of care dependency is useful to obtain data for appropriate resource allocation among care recipients.

Key words: Activities of Daily Living, Arabic translation, care dependency, Egypt, older persons, psychometric study

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Introduction

Ageing is an emerging phenomenon in Arab countries. The Arab Human Development Report (UNDP/RBAS 2002) indicates that in the Arab region life expectancy at birth between 1950–1955 was 40·5 years for men and 42·6 years for women in comparison with the year 2000 when it had reached 62·6 years for the male and 65·2 years for the female

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population. For the year 2050, this life expectancy is estimated to reach 75·2 years for men and 79·4 years for women (ESCWA 2007). An increasing number of people aged 60 and above will be associated with an increase of disabilities and ensuing care dependency. Based on data from the Global Burden of Disease Study on severe levels of disability and the calculation of population projections, Harwood *et al.* (2004) predict an increasing number of care dependent people in the Middle East. They demand, however, improved data collection on this issue. Such data are required for an appropriate allocation of nursing services for older persons in these countries. To date there is still a scarcity of such information.

Background

A commonly used measure of disability is the Activities of Daily Living (ADL) scale by Katz and Akpom (1976). The items of this scale reflect functional limitations and refer to the abilities bathing, dressing, transferring, toileting, feeding and continence capacities as perceived by the interviewed person. In a recent concept analysis of care dependency Boggatz *et al.* (2007) pointed out that functional limitations are not equal to care dependency. They argue that only if a particular subjective need is affected by a functional limitation will the respective person feel the need to get support from a care giver. For example,someone who has no desire to leave his house will not demand support to do so. If older persons reduce such needs, care dependency will decrease as well. Functional limitations should thus be perceived as a factor that influences care dependency, but not as a synonym of this concept. Consequently, the authors defined care dependency as a subjective, secondary need for support in the domain of care to compensate a self-care deficit. Based on the analysis of the existing literature they conclude that this definition can be shared by both care givers and care recipients.

An instrument that meets the criteria of the above definition and that can be used as an empirical referent of this concept is the Care Dependency Scale (CDS) (Dijkstra 1998). It was developed in the Netherlands and is based on the nursing theory of Henderson (1991). The instrument provides a framework where human needs with regard to nursing care can be assessed and consists of 15 items concerning bio-psycho-social needs. It has, meanwhile, been translated into 12 different languages. Eight of the existing translations have been psychometrically tested and showed good reliability and validity (Dijkstra *et al.* 2000, 2003). Factor analysis for all tested versions proved that all items were affected by the same underlying care dependency concept and showed strong similarities across the different countries (Dijkstra *et al.* 2000; Dijkstra *et al.* 2003). It seemed thus worthwhile to develop an Arabic version of this instrument to obtain relevant information about care dependency among the older population in Arab Countries.

According to the theory of Henderson (1991), the basic human needs measured by the scale are universal. In their concept analysis, Boggatz *et al.* (2007) follow this assumption, but they add that the perception of such needs in a concrete situation depends as well on how care givers and care recipients define the nature of required support – this occurring in a process of social negotiations which is embedded in a cultural value system shared by both sides. By its nature, care dependency is universal, but in its particular expression it is culture-specific at the same time. As a consequence, one should be clear about the conceptual similarities and differences of care dependency in different cultures, if a translation of the CDS is to be used.

In a Delphi study with Egyptian experts of geriatric care, Boggatz *et al.* (2009a) explored the conceptual and semantic equivalence of the original CDS and the Arabic version. After rephrasing items according to suggestions of the panellists, 11 of the original 15 items were perceived as relevant by the majority of panellists. Four items, however, caused controversial reactions. These items concerned the need for support with regard to learning something new, contact with others, directing one's behaviour according to social standards and recreational activities. Comments of some panellists indicated that contact with others or meeting social standards were not a problem for older persons in Egypt, whereas learning something new was not perceived as necessary in old age. The need for recreational activities was seen as depending on the social status of the older person. On the other hand, panellists suggested adding two further items on needs related to taking medication and spiritual support. Although these results suggest that most items seem to be appropriate for the Egyptian context, the experts' opinion cannot not be generalised. To determine whether or not the Arabic version measures the same concept of care dependency as the original version, it is necessary to investigate the psychometric properties of the Arabic version.

As Martin and Kinsella (1994) point out, investigations on disability and morbidity in developing countries rely commonly on self-reported assessments due to reasons of feasibility. On the other hand, to obtain data of those who cannot speak for themselves, proxy reports are recommendable. Furthermore, Boggatz *et al.* (2009b) found in a qualitative study on home care recipients in Egypt that family members of older persons may exert a considerable influence on care-related decisions. It is thus important to know whether ratings of older persons and their proxy are similar or different.

Even if care recipients and proxies concur on the concept of care dependency, their ratings of the extent of this problem may differ due to the subjective nature of this condition. When functional limitations were measured, comparisons between self-reports and proxy assessments yielded different results. Some authors suggest that proxy assessment by informal care givers conforms with self-reports (Santos-Eggiman *et al.* 1999). Other studies indicate that professional care givers as proxies identify more dependency than older persons themselves (Morrow-Howell *et al.* 2001, Hansen *et al.* 2002). With regard to care dependency, such differences have not yet been investigated. The CDS is available for self-assessment and proxy reports. The formulation of the items is the same with the only exception that the questions are asked in the third voice ('does the older person need…?') for proxy assessment and in the second voice ('do you need…?') for self-assessment. If there are discrepancies between self and proxy assessment it may be difficult to decide which rating is more appropriate. Self-reports, however, have the potential to challenge proxy assessments and it is important to know whether or not they reflect the opinion of persons in the environment of older care recipients.

Aim

The aim of this study was to determine the validity and reliability of the modified Arabic Care Dependency Scale for Self-Assessment of Older Persons in Egypt. In addition, self-assessments of care recipients should be compared to proxy assessments.

Method

Design

A cross-sectional study with a sample of older persons living in Greater Cairo was conducted in the period from October 2007–January 2008. Study participants rated themselves and if possible proxy ratings concerning care dependency by a family member or a person working as a care giver were obtained. A sub-sample of participants rated their care dependency for a second time two weeks after completion of the initial self-assessment.

Sample

The sample was composed of three different groups: residents of nursing homes, home care recipients and for the purpose of comparison older persons who did not receive care. To identify care recipients willing to participate in this study, care providing institutions were contacted in a first step. According to a list of the Ministry of Social Affairs (2005, unpublished list) which was updated by the Geriatric Medical Department of the Ain Shams University in Cairo, there were 62 registered nursing homes in Greater Cairo. In addition to the already existing official list, the authors identified 31 nursing homes for the same area through personal contacts and a list obtained from a nursing home of the Catholic Church. Twenty nine of these 93 nursing homes could not be contacted due to incorrect information on phone numbers or addresses in the available lists. Of the remaining 64 homes, 25 gave permission for data collection among their residents. Home care recipients were identified through home care services. At the time of data collection, five services of this kind were operating in Greater Cairo. Two agreed to participate in this study. Older persons who did not receive care were approached in two ways. The first way was to contact members of clubs for older persons. Such clubs require the payment of a membership fee. As a consequence, older persons from the better-off strata of Egyptian society were encountered there. Those who could not afford to join such a club were contacted through volunteer services of the Coptic Orthodox Church and an Islamic NGO, which both run programs to support older persons with limited income. To be included as a participant in this study the person had to be above 60. With regard to the proxy assessment, a family member or a care giver of the care-providing institution were asked to fill in the respective questionnaire. The care givers were not fully trained nurses but persons who had received on-the-job training in the nursing homes, or a training course for the period of three months if they were working in a home care service (Care with Love 2006). The choice of the proxy depended on the availability of the respective person. Reassessments were performed if the older person agreed to respond a second time.

Data collection

The questionnaire contained items about demographic characteristics of the participants, the ADL scale and the CDS. The ADL scale as a measure of functional limitations was chosen due to its previous use in Egypt (Nandakumar *et al.* 1998). The Arabic translation of this scale provided by the Regional Office for the Eastern Mediterranean of the WHO (Fillenbaum 1986) was applied. The items of the ADL scale are based on a three point Likert scale with the lowest value representing no functional limitation. The sum score may range from 6–18 points.

The CDS was used in its extended Arabic version based on the Delphi study by Boggatz *et al.* (2009c). Accuracy of

translation had been assured by the authors of this study. The extended version contained two additional items concerning the need for help with taking medication and with spirituality. To facilitate the understanding of items by illiterate participants, every item was supplemented by a picture illustrating the meaning of the particular question. Figure 1 shows one such item together with its translation into English for the purpose of illustration. CDS items are based on a five point Likert scale with the lowest value representing complete dependency. The sum score of the extended scale may range from 17–85 points.

As a large number of older persons were expected to be either illiterate or unable to fill in questionnaires due to physical impairments, all study participants were visited by Egyptian research assistants, who read the questionnaire for the older persons and marked the items according to their responses. All research assistants had received training in data collection for a period of two days.

Ethical considerations

Research approvals were obtained from all care providing institutions of which care recipients participated in this study. An approval of an ethics committee could not be obtained, as in Egypt most research proposals are only reviewed by departmental and faculty councils (Rashad *et al.* 2004). The Egyptian research assistants explained study goals, the procedure of data collection and the estimated time of commitment to all participants. Anonymity of data and the right to withdraw was assured. As many members of the target group were only semi-literate or had difficulties in reading or writing due to physical impairments, informed consent was obtained verbally in the presence of a family member or a representative of the care providing institution. Written consent is culturally not adequate in Egypt, as it implies a lack of trust in one's word and might be interpreted as an insult if a participant has already given verbal consent (Rashad *et al.* 2004).

Analysis

To determine criterion validity, the CDS was compared to the Arabic version of the Activity of Daily Living (ADL) scale. Functional limitations as measured by the ADL scale were expected to be an influencing factor of care dependency but not identical with this construct. Both constructs, however, should be correlated. To test this assumption Pearson's *r* was calculated.

Construct validity of the scale was determined by known groups technique and exploratory factor analysis. For the purpose of this study it seemed reasonable to assume that care recipients (i.e. the combined group of home care recipients and nursing home residents) differ significantly from non-care recipients with regard to their care dependency. To test this assumption an independent *t*-test was performed. As care recipients were divided into home care recipients and nursing home residents, we performed in addition an ANOVA with *post hoc* tests to investigate further the differences between all three groups.

Exploratory factor analysis was used to detect the underlying dimensions of the scale and the correlation of each item to the respective dimensions (Polit & Beck 2008). To assess the suitability of data for factor analysis Bartlett's Test of Sphericity was performed and the Kaiser-Meyer-Olkin value was calculated. In addition we conducted a parallel analysis with the statistical program by Watkins (2000) to compare the initial eigenvalues to those obtained from a randomly generated data set of the same size. We applied principal component analysis based on the correlation matrix. To aid the interpretation of extracted components Varimax rotation was performed. This approach has been used in the previous testing of the CDS (Dijkstra *et al.* 2000, 2003) and was chosen for the reason of comparability. To explore whether the results would change if different assumptions were applied to the analysis we repeated the calculation with oblimin rotation. The analysis was conducted for the self assessment and the proxy assessment version of the CDS to investigate whether both versions yield the same factors. In both cases the original 15 item version and the modified 17 item version were subjected to the same procedure.

With regard to the instrument's reliability, internal consistency was examined by calculating Cronbach's alpha and test-retest reliability was tested by calculating the Intraclass Correlation (ICC) between two self-assessments at two different points of time. As there was a different rater for

F لبس و خلع الملابس
هل تحتاج مساعدة للبس و خلع الملابس؟

① أعتمد كليا على المساعدة
② أحتاج إلى المساعدة كثيرا
③ أحتاج إلى المساعدة نصف و نصف
④ أحتاج إلى المساعدة قليلا
⑤ لا أحتاج إلى المساعدة

F Putting on and taking off clothes
Do you need help to put on and take off your clothes?

① I depend completely on help
② I depend on help a lot
③ I depend on help fifty-fifty
④ I depend on help a little
⑤ I do not need help

Figure 1 CDS Item 'Clothing' in the Arabic self-assessment version, © the authors.

every participant, ICC (1.1) was chosen. An ICC >0·7 is considered to be good (De Vet *et al.* 2006). In addition, the proportion of complete agreement between two ratings and the standard error of measurement (SEM) were calculated as measures of agreement. Parameters for all items were calculated separately for non-care recipients, home care recipients and nursing home residents.

Finally the mean differences between self-reports and proxy assessments were calculated. In this study proxies were either family members or persons working as a care giver. Their judgements may be influenced by the different degree of familiarity with the rated subject. For this reason, data of these two groups were analysed separately. For all statistical tests, participants were excluded if they had missing values. The number of included cases is thus reported separately for each test. SPSS 15.0 for Windows (SPSS, IL, Chicago, USA) was used for analysis.

Results

Altogether 611 older persons participated in this study. The mean age of the study participants was 71·7 years (SD 8·8). Table 1 shows the sample distribution by gender and kind of received service. Three hundred and ninety-three of the participants were female, 218 were male. 267 of the participants did not receive any kind of care, 57 were home care recipients and 287 were residents in nursing homes. One hundred and seventy-one of the study participants rated themselves a second time on the CDS.

Table 2 shows the mean sum scores of the CDS by gender and type of service received. Home care recipients had the lowest average sum scores on the CDS (i.e. the highest care dependency). Among non-care recipients and home care recipients, male study participants had a lower mean in their CDS sum scores in comparison to female participants. Among nursing home residents, women had a lower CDS sum score in the average.

Table 1 Sample composition by gender and kind of received service

	Female	Male	Total
No care recipient	161	106	267
Home care recipient	46	11	57
Nursing home	186	101	287
Total	393	218	611

Table 2 CDS mean sum scores by gender and kind of received service

	Female	Male	Total
No care	74·82	73·26	74·20
Home care	60·39	43·73	57·18
Nursing home	70·89	74·04	72·00
Total	74·82	72·09	71·54

Validity

With regard to criterion validity, there was a strong correlation between the sum scores of the ADL scale and the CDS ($r = -0{\cdot}799$) as was expected. With regard to construct validity, the comparison between the known groups of care recipients ($n = 341$, mean = 69·5, SE 14·3) and non-care recipients ($n = 260$, mean = 74·2, SE 10·5) showed that care recipients on average had a lower CDS sum score which indicates a higher care dependency. This difference was significant $t\ (598{\cdot}2) = -4{\cdot}61$, $p < 0{\cdot}001$. With regard to the ANOVA, there were unequal group sizes and a lack of homogeneity of variance between the three groups. For this reason we report Welch's *F*-ratio, which is a more robust measure if these two assumptions of ANOVA are violated (Field 2005). The combined effect between the three groups was significant, $F\ (2, 145) = 25{\cdot}5$, $p < 0{\cdot}001$. Due to the violated assumptions for ANOVA, the Games-Howell test was suitable as a *post hoc* investigation (Field 2005). The test showed that home care recipients (I) had on average significantly lower CDS sum scores (i.e. higher care dependency) than non-care recipients (J) [I–J = −17·0, p (two-tailed) < 0·001] and nursing homes residents (J) [I–J = −14·8, p (two-tailed) < 0·001]. The difference in the mean CDS sum scores between nursing home residents (I) and non-care recipients (J) was not significant [I–J = −2·2, p (two-tailed) > 0·05].

With regard to factor analysis, data were suitable for this procedure. The inspection of the correlation matrix revealed that most coefficients were above 0·3. The Kaiser-Meyer-Olkin value for all analysed combinations of data was above 0·9 exceeding the recommended value of 0·6 (Field 2005). Bartlett's Test of Sphericity reached as well statistical significance ($p < 0{\cdot}001$) in all cases. Factor analysis of self and proxy assessment yielded the same two-factor structure for both versions. Kaiser's criterion of eigenvalues >1 for factor extraction and the point of inflexion in the scree plot at factor 3 suggested this solution in both cases. This was further supported by the results of parallel analysis which showed only two components with eigenvalues exceeding the corresponding values of the randomly generated data matrices (Table 3). When the items 'Medication' and 'Spirituality' of the extended version were added to the original 15 items, no change of this structure occurred in both versions.

Table 4 shows the results of the factor analyses for self and proxy assessment. For both versions, factor loadings, eigenvalues after rotation and percentage of variance of the

Table 3 Initial eigenvalues from principal component analysis (PCA) and corresponding criterion values from parallel analysis for the original and extended CDS for self-assessment and proxy assesment

	Self-assessment				Proxy assessment			
	Original (15 items) (n = 603)		Extended (17 items) (n = 601)		Original (15 items) (n = 465)		Extended (17 items) (n = 465)	
	PCA	Parallel analysis	PCA	Parallel analysis	PCA	Parallel analysis	PCA	Parallel analysis
Component 1	6·40	1·28	7·06	1·30	7·68	1·32	8·45	1·34
Component 2	1·93	1·22	2·06	1·24	1·95	1·25	2·09	1·28
Component 3	0·96	1·17	0·97	1·20	0·89	1·19	0·90	1·22
Component 4	0·85	1·13	0·87	1·16	0·72	1·14	0·78	1·17
Component 5	0·79	1·09	0·81	1·12	0·59	1·10	0·66	1·13

Table 4 Factor loadings, eigenvalues after rotation and percentage of variance of the original and extended CDS for self-assessment and proxy assesment

	Self-assessment (n = 603)				Proxy assessment (n = 465)			
	Original (15 items)		Extended (17 items)*		Original (15 items)		Extended (17 items)	
	Factor		Factor		Factor		Factor	
CDS item	1	2	1	2	1	2	1	2
Eating & drinking	**0·55**	0·32	**0·54**	0·34	**0·63**	0·31	**0·63**	0·33
Toileting	**0·87**	0·10	**0·87**	0·10	**0·91**	0·09	**0·90**	0·09
Transferring	**0·83**	0·22	**0·83**	0·22	**0·88**	0·15	**0·88**	0·15
Mobility	**0·83**	0·15	**0·82**	0·17	**0·89**	0·15	**0·89**	0·14
Day & night rhythm	**0·49**	0·26	**0·48**	0·26	**0·64**	0·25	**0·63**	0·26
Getting (Un)dressed	**0·84**	0·14	**0·84**	0·14	**0·89**	0·17	**0·89**	0·19
Body temperature	**0·79**	0·23	**0·78**	0·26	**0·84**	0·25	**0·84**	0·26
Hygiene	**0·80**	0·07	**0·80**	0·09	**0·78**	0·19	**0·78**	0·21
Avoidance of danger	**0·78**	0·16	**0·78**	0·18	**0·71**	0·34	**0·71**	0·34
Communication	0·29	**0·57**	0·29	**0·55**	0·35	**0·70**	0·35	**0·68**
Contact with others	0·15	**0·78**	0·14	**0·78**	0·23	**0·76**	0·22	**0·76**
Sense of manners	0·06	**0·72**	0·05	**0·69**	0·07	**0·77**	0·06	**0·76**
Houshold	**0·52**	0·00	**0·51**	0·01	**0·57**	0·24	**0·57**	0·25
Recreation	0·20	**0·64**	0·18	**0·64**	0·32	**0·66**	0·32	**0·64**
Learning	0·00	**0·66**	−0·01	**0·65**	0·10	**0·77**	0·10	**0·75**
Medication	–	–	**0·66**	0·18	–	–	**0·64**	0·38
Spirituality	–	–	0·29	**0·61**	–	–	0·24	**0·65**
Eigenvalue	5·69	2·63	6·12	3·01	6·43	3·20	6·85	3·69
% variance	37·9	17·5	35·99	17·7	42·9	21·3	40·3	21·7

*Two missing values.
Bold values show factor loadings.

original 15 item version and the extended 17 item version are presented. Factor loadings printed in bold indicate that the loading of this item is associated with the factor of the respective column. In all analyses, the items 'Eating & drinking', 'Toileting', 'Transferring', 'Mobility', 'Day & night rhythm', 'Body temperature', 'Hygiene', 'Avoidance of danger', 'Household activities' (and 'Medication' in the extended version) are associated with an underlying factor which may be labelled as basic needs. The items 'Communication', 'Contact with others', 'Sense of manners', 'Recreation', 'Learning' (and 'Spirituality' in the extended version) were related in all analyses to the second factor which summarises psycho-social needs. A repetition of the analyses with oblimin rotation yielded in all cases the same structure of factors and related items.

Reliability

For the extended self-assessment scale, Cronbach's α was 0·90 which indicates a good internal consistency. Only the

item 'Learning' had a corrected item-total correlation below 0·3 in which case the item should be dropped (Field 2005). As factor analysis had revealed two factors, we computed as well Cronbach's α for both of them. The respective value for the factor 'basic needs' was 0·91 and for the factor 'psycho-social needs' 0·75. For the extended proxy assessment scale Cronbach's α was 0·93. Here, no item of the scale had a corrected item-total correlation below 0·3. The two factors of the proxy assessment had α –values of 0·94 and 0·83 respectively.

Table 5 shows the results for the test-retest reliability of self-reported care dependency. ICCs >0·7 are indicated in bold. For items correlated to the factor 'basic needs', 3 items met this criterion among non-care recipients, 10 among home-care recipients and 7 among nursing home residents. Proportion of agreement in this item group ranged from 0·48–0·88 among non-care recipients, from 0·5–0·85 among home-care recipients and from 0·62–0·93 among nursing home residents. The standard error of measurement ranged in this group from 0·34–0·77 for non-care recipients, from 0·4–0·94 for home care recipients and from 0·28–1·09 for nursing home residents. For items correlated to the factor 'psycho-social needs', it was only among non-care recipients that five items had an ICC >0·7. Proportion of agreement for these items ranged from 0·67–0·88 among non-care recipients, from 0·65–0·73 among home care recipients and from 0·69–0·9 among nursing home residents. The SEM in this group was between 0·31–0·49 among non-care recipients, between 0·53–0·97 for home care recipients and between 0·54–0·81 for nursing home residents.

Comparison of self and proxy assessment

Table 6 shows the comparison between self-assessment and proxy assessment by care giver or family member respectively. For 459 of the 611 older persons a proxy assessment was obtained by a care giver (n = 332) or a family member (n = 127). In both cases proxy ratings resulted for all items in the average in lower CDS scores (i.e. in higher care dependency). These differences ranged from 0·06–0·89 in the comparison with care givers and from 0·08–0·43 for single items.

Discussion

As it was expected there was a strong correlation between the sum scores of the ADL scale and the CDS. This supports the

Table 5 Percentage of complete agreement, intraclass coefficients, and standard error of measurement for CDS items

	No care (n = 42)			Home care (n = 26)			Nursing home (n = 103)		
	p_0*	ICC†	SEM‡	p_0*	ICC†	SEM‡	p_0*	ICC†	SEM‡
'Basic needs'									
Eating & drinking	0·69	0·55	0·55	0·73	**0·79**	0·67	0·93	**0·84**	0·28
Toileting	0·88	0·60	0·48	0·69	**0·85**	0·62	0·80	**0·81**	0·67
Transferring	0·83	0·69	0·35	0·85	**0·93**	0·41	0·70	**0·71**	0·71
Mobility§	0·79	0·57	0·49	0·81	**0·89**	0·52	0·77	**0·83**	0·66
Day & night rhythm	0·69	0·64	0·39	0·81	**0·91**	0·40	0·83	0·58	0·55
Clothing	0·86	**0·70**	0·41	0·50	**0·79**	0·75	0·73	**0·79**	0·69
Body temperature	0·81	**0·73**	0·36	0·62	0·60	0·94	0·72	0·60	0·80
Hygiene	0·74	**0·90**	0·34	0·65	**0·87**	0·60	0·68	**0·77**	0·82
Danger	0·64	0·64	0·62	0·65	**0·79**	0·71	0·62	0·57	0·94
Household	0·48	0·69	0·77	0·69	**0·70**	0·63	0·66	**0·70**	0·94
Medication§	0·62	0·50	0·60	0·62	**0·84**	0·67	0·65	0·56	1·09
'Psycho-social needs'									
Communication¶	0·88	**0·77**	0·31	0·73	0·61	0·67	0·86	0·00	0·56
Contact with others	0·81	**0·72**	0·41	0·65	0·47	0·96	0·90	0·25	0·54
Manners	0·83	**0·79**	0·33	0·65	0·69	0·53	0·78	0·45	0·63
Recreation	0·79	**0·81**	0·43	0·65	0·63	0·79	0·80	0·34	0·69
Learning	0·76	0·69	0·47	0·65	0·50	0·75	0·83	0·08	0·81
Spirituality	0·67	**0·78**	0·49	0·65	0·65	0·97	0·69	0·42	0·80

*Overall proportion of agreement.
†Intraclass coefficient ICC (1.1).
‡Standard error of measurement.
§One participant with missing values in the group nursing homes.
¶One participant with missing values in the group no care.
Bold values show intraclass correlations above 0·7 (i.e. acceptable values).

Table 6 Differences between self and proxy assessment

	Self-assessment vs. care giver (n = 332)			Self-assessment vs. family member (n = 127)		
Item	Mean self-assess	Mean care giver	Diff.	Mean self-assess.	Mean fam. member	Diff.
Eating & drinking	4·67	4·13	0·54	4·63	4·43	0·20
Toileting	4·00	3·64	0·36	4·43	4·31	0·12
Transfering	4·20	3·78	0·42	4·58	4·46	0·12
Mobility	3·91	3·48	0·43	4·30	4·07	0·23
Day & night rhythm	4·63	4·21	0·42	4·60	4·34	0·26
Clothing	3·85	3·25	0·60	4·31	4·09	0·22
Body temperature	4·26	3·41	0·85	4·45	4·15	0·30
Hygiene	3·51	2·77	0·73	4·24	4·02	0·21
Danger	3·85	2·99	0·85	4·02	3·61	0·40
Communication	4·72	4·07	0·65	4·77	4·37	0·40
Contact with others	4·61	4·08	0·54	4·65	4·21	0·43
Manners	4·68	4·11	0·57	4·34	4·04	0·30
Household	2·20	2·14	0·06	2·69	2·48	0·21
Recreation	4·25	3·67	0·58	4·27	4·12	0·15
Learning	4·48	3·76	0·72	4·20	4·06	0·14
Medication	3·91	3·02	0·89	4·24	3·87	0·37
Spirituality	4·39	3·83	0·56	3·94	3·87	0·08
CDS total	70·12	60·36	9·76	72·65	68·50	4·15

assumption that functional limitations are a related factor of self-perceived care dependency. The Arabic version of the CDS also has the ability to differentiate between care recipients and non-care recipients as evidenced by the significant difference in the independent t-test. The further differentiation of care recipients showed that a significant difference is only found between home care recipients and the two other groups. This does not mean that the CDS is unable to distinguish appropriately between known groups. The lack of difference between non-care recipients and nursing home residents reflects the current situation of care provision in Egypt. In a qualitative study about care-seeking attitudes of nursing home residents Boggatz *et al.* (2009c) report that nursing homes in this country were originally not intended to meet the needs of highly care dependent persons. They were rather meant to be a place where older persons who have an insufficient social network can socialise with peers. In such a context residents of nursing homes must not be significantly different from non-care recipients with regard to their care dependency. The findings of this study suggest that it is mainly home care services that respond to the self-care deficits of older persons in contemporary Egypt.

This study identified for a first time a two factor solution for the CDS. As we used the same procedure as in the previous analyses this difference is unlikely to result from the analytical approach. In all previous analyses, the variance explained by the one factor solution ranged from 54·3–73·6% and if a second possible factor was added only 5·5–9·9% of variance could be explained in addition (Dijkstra *et al.* 2000, 2003). In our study two factors were needed to reach a percentage of explained variance similar to the one factor solution of the previous studies. The second factor in our analysis added a percentage of explained variance which was about half of the first factor's contribution.

There may be two explanations for this difference to the previous results. On the one hand this may reflect a cultural difference in the perception of care dependency in Egypt compared to the notion of this concept in European countries. The same structure for both the self-assessment and the proxy version of the Arabic CDS supports this assumption. According to the concept analysis of Boggatz *et al.* (2007), care recipients and care givers of a particular culture will share the underlying concept of care dependency even if they differ in the extent of their ratings. They may, however, disagree with members of other cultures about this concept. The results of the previously cited Delphi study (Boggatz *et al.* 2009a) point in a similar direction. Four of the items that were associated with the factor of psycho-social needs caused controversial reactions among the panellists of this study. 'Contact with others' for example may not be perceived as a problem in a culture where people maintain much closer social networks than in European countries. The two factor solution is furthermore in line with Maslow's theory of needs (Maslow 1943) which informed Henderson's nursing theory and the CDS. According to Maslow, people will care about basic needs like food and shelter before they consider higher psycho-social needs. Given the lower levels of prosperity in developing countries, it is not surprising that older persons

there attach another value to their basic needs. Questions about learning needs or recreation may be less relevant for many of them.

On the other hand, the different factor solution may have been caused by the fact that unlike in all previous investigations about the CDS, no fully trained nurse participated in this study. Self-raters and their relatives are not familiar with the way professional nurses perceive their clients. The same concerns the proxies labelled in this study as care givers. With a maximum of three months of training, they cannot be compared to a professional nurse although they represent the expertise in older persons' care that is currently available in Egypt. It cannot be decided here which explanation for the two factor structure of the Arabic CDS is more appropriate as to date psychometric properties of European self-assessment versions have not yet been reported. In any case, the two factor solution for the Arabic CDS limits the use of this instrument for cross-cultural comparisons between Egyptians and Europeans. For Egyptians, items referring to psycho-social needs apparently have a different meaning in the context of nursing care for older persons.

With regard to reliability, self and proxy assessments have a good internal consistency. Intraclass correlations show that items correlated to the factor 'basic needs' have the best test-retest reliability among home care recipients who also have the highest care dependency. For non-care recipients, the reliability of these items seems to be limited. If one compares the standard error of measurement for both groups, it turns out that this error was higher for most items among home care recipients. The ICC is a measure that describes an instrument's ability to discriminate between persons despite measurement error (De Vet *et al.* 2006). Higher ICC values for home care recipients thus mean that in this group older persons had a higher variability with regard to their care dependency whereas non-care recipients are rather homogenous. One has to conclude that items reflecting basic needs discriminate better in settings where this aspect of care dependency is more prevalent. For items reflecting psycho-social needs, the opposite is the case. Here ICC values are good among non-care recipients, who also achieve the lowest standard errors of measurement. For nursing home residents, all ICC values for these items were $< 0{\cdot}5$ despite high proportions of agreement and measurement errors not higher than for items that achieved good ICCs. This indicates little variance between nursing home residents with regard to this aspect of dependency. A possible explanation for this self-rating behaviour is that questions about psycho-social needs were less important in this group. The older persons thus spent less effort in differentiating between their respective degrees of dependency. The same may be the case for non-care recipients with regard to basic needs. Given the fact that ageing and related disabilities are a new phenomenon in Egypt, it is understandable that these study participants were less concerned about problems which were only partly familiar to them. The CDS, like the ADL scale, was originally developed to monitor disability related problems which are typically encountered in clinical settings. Persons who are not exposed to such experiences may perceive the relevance of the respective items in a different way. One should thus be cautious with regard to the reliability of such measurements if they are used in surveys outside clinical settings. Unfortunately reports about psychometric properties of the ADL scale for different settings in developing countries are not available. For this reason it cannot be decided here whether the ADL scale would yield better results. With regard to the CDS, items related to basic needs have the best reliability among care recipients.

The difference between self and proxy assessment is not surprising. Higher care dependency in proxy ratings may be due to overprotective attitudes of care givers and family members or a denial of care needs among the older persons. Which assessment is more appropriate cannot be decided here as this would have required the measurement of an external criterion. This was not feasible in this study. All that can be said is that surveys based on self assessed care needs are likely to yield lower scores for care dependency.

The main limitation of this study was that no randomised sample of older Egyptians could be obtained. The focus on self-assessment precludes furthermore from obtaining a complete picture of care dependency among this group, as those who could not speak for themselves were excluded from the study.

Conclusion and relevance for clinical practice

CDS items related to basic needs are valid to measure care dependency among older Egyptians. Their reliability is good for care recipients with the exception of a few items. Items related to psycho-social needs raise the questions whether they cover a relevant aspect for care recipients in Egypt. In this group of older persons they have a low reliability. Proxy assessments will yield higher care dependency than self-assessments. Self-assessed care dependency may be used to determine the prevalence of this phenomenon among care recipients in Egypt. Such data are useful to identify where nursing care is needed most. Our data shows that the highest care dependency is found in home care settings. This underlines the importance of this relatively new kind of service for care dependent Egyptians and raises the question whether it is useful to focus mainly on the establishment of

new nursing homes, as it currently occurs in Greater Cairo. Future studies using the CDS may provide an answer, which is important in a developing country like Egypt with its scarce economical resources.

Contributions

Study design: TB, TD; data collection: TB, TF, AM; data analysis: TB, AD, CL; manuscript preparation: TB.

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